DRINKING WATER SURVEILLANCE PROGRAM

THUNDER BAY (LOCH LOMOND) WATER TREATMENT PLANT

ANNUAL REPORT 1990

Ontario
Environment
Environnement

ISSN 0843-834X

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ANNUAL REPORT 1990

AUGUST 1992

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PIBS 1988
Log 92-2302-312

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

THUNDER BAY (LOCH LOMOND) WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Thunder Bay (Loch Lomond) water treatment plant is a treatment facility which partially treats water from Loch Lomond. The only processes are corrosion control and disinfection. This facility has a design capacity of 77.00 x 1000 m^3/day. The Thunder Bay (Loch Lomond) water treatment plant serves a population of approximately 43,400 in the south district of Thunder Bay.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

The health related guideline for turbidity was exceeded in one sample. The District Officer was notified.

The Thunder Bay (Loch Lomond) water treatment plant, for the sample year 1990, produced adequate quality water and this was maintained in the distribution system.

The detection of elevated lead in the standing samples at one distribution system site would indicate that household taps should be flushed before water is used for consumption.

The current MOE policy (#15-14-01) requires that surface waters be provided with a minimum treatment which includes coagulation, flocculation, filtration and disinfection. This was not provided by Thunder Bay (Loch Lomond) water treatment plant.

93-02473/

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP)

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

	SCAN	SITE RAW TESTS	POSITIVE	%POSITIVE	TREATED TESTS	POSITIVE	%POSITIVE	SITE 1 TESTS	POSITIVE	%POSITIVE	SITE 2 TESTS	POSITIVE	%POSITIVE
	BACTERIOLOGICAL	8	2	25	12	2	16	3	1	33	16	4	25
	CHEMISTRY (FLD)	21	21	100	55	55	100	25	25	100	63	46	73
	CHEMISTRY (LAB)	231	150	64	231	165	71	180	151	83	396	331	83
	METALS	264	52	19	264	56	21	230	82	35	506	153	30
	CHLOROAROMATICS	154	0	0	154	0	0	70	0	0	112	0	0
	CHLOROPHENOLS	12	0	0	6	0	0	.	.	.	.	.	.
	PAH	166	0	0	166	0	0	17	0	0	17	0	0
	PESTICIDES & PCB	362	0	0	375	2	0	106	1	0	170	0	0
	PHENOLICS	11	2	18	11	2	18	.	.	.	.	.	.
	SPECIFIC PESTICIDES	62	0	0	56	0	0	5	0	0	8	0	0
	VOLATILES	290	0	0	290	30	10	145	15	10	290	30	10
TOTAL		1581	227		1620	312		781	275		1578	564	

DRINKING WATER SURVEILLANCE PROGRAM

THUNDER BAY (LOCH LOMOND) WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Thunder Bay (Loch Lomond) water treatment plant in May 1988. Previous annual reports have been published for 1988 and 1989.

PLANT DESCRIPTION

The Thunder Bay (Loch Lomond) water treatment plant is a treatment facility which partially treats water from Loch Lomond. The only process consists of corrosion control and disinfection. This facility has a design capacity of 77.00 x 1000 m^3/day. The Thunder Bay (Loch Lomond) water treatment plant serves a population of approximately 43,400 in the south district of Thunder Bay.

The sample day flows ranged from 3.22 x 1000 m^3/day to 34.90 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, are General Chemistry and Metals. The free flow sample represented fresh water from the distribution system main since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water between the two sampling points by the sample day flow. For example, if it was determined that the retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters in 1990. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analysis were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP data base as submitted by plant personnel.

Table 3 contains information on the delay time between the raw and treated water sampling, flow rate and treatment chemicals dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guidelines.

INORGANIC & PHYSICAL

CHEMISTRY (LAB)

Alkalinity was below the ODWO Aesthetic or Recommended Operational Guideline of 30-500 mg/L in all 27 treated and distributed water samples and ranged between 20.8 mg/L - 28.1 mg/L.

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 Hazen units (HZU) in all 27 treated and distributed water samples with a maximum reported value of 8.9 HZU.

Dissolved organic carbon exceeded the ODWO Maximum Desirable Concentration of 5.0 mg/L in 7 of 27 treated and distributed water samples with a maximum reported value of 5.2 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin turbidity unit (FTU).

The laboratory turbidity exceeded the Maximum Acceptable Concentration in 1 of 11 treated water samples with a reported value of 1.05 FTU but this could not be confirmed by the field turbidity as it was not reported along with the submitted samples.

METALS

The results of the metal scan showed that no parameters were reported above the guidelines.

Elevated lead levels were detected in standing water at one distribution system site which indicates that household taps should be flushed before the water is consumed.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was detected at positive levels in 3 of 6 treated and distributed samples with a maximum reported value of 235.0 ng/L. The United States Environmental Protection Agency has an Ambient Water Quality Criteria of 206,000 ng/L.

The results of the other parameters in the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace values.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 25 treated and distributed water samples analyzed with a maximum level of 145.2 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Thunder Bay (Loch Lomond) water treatment plant, for the sample year 1990, produced adequate quality water and this was maintained in the distribution system.

The health related guideline for turbidity was exceeded in one sample. The District Officer was notified.

The current MOE policy (#15-14-01) requires that surface waters be provided with a minimum treatment which includes coagulation, flocculation, filtration and disinfection. This was not provided by Thunder Bay Loch Lomond facility.

The detection of elevated lead in the standing samples at one distribution system site indicates that household taps should be flushed before water is used for consumption.

Due to the elvated lead levels present in the distribution system standing samples, the process used for corrosion control should be reviewed.

FIGURE 1

THUNDER BAY (LOCH LOMOND) WATER TREATMENT PLANT

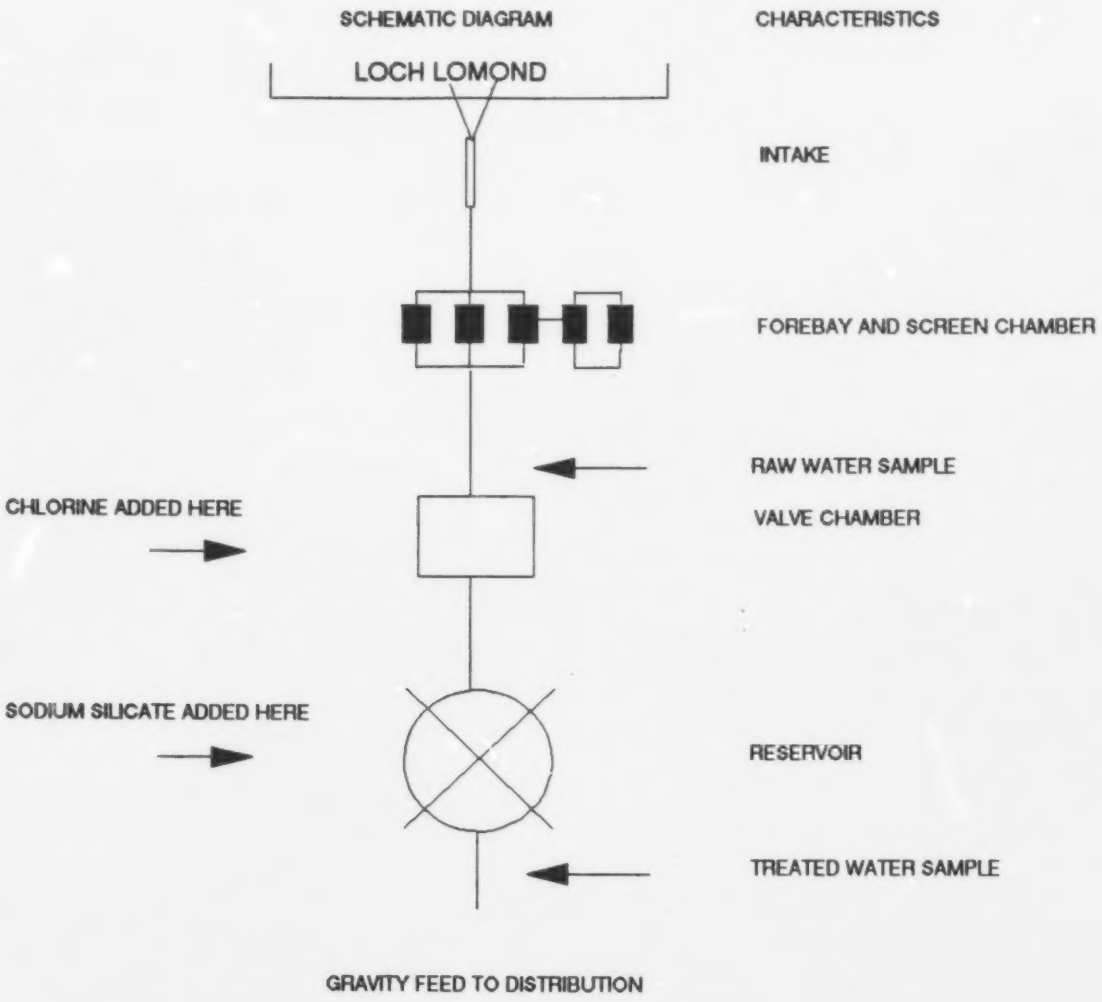

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220000282
PLANT NAME: THUNDER BAY (LOCH LOMOND WTP)

DISTRICT: THUNDER BAY
REGION: NORTHWEST
DISTRICT OFFICER: D. MURRAY

UTM #: 163304805351430

PLANT SUPERINTENDENT: VEIKKO LONG

ADDRESS: 500 DONALD STREET EAST
THUNDER BAY, ONTARIO
P7E 5V3
(807-683-3251)

MUNICIPALITY: THUNDER BAY
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	77.00	(X 1000 M3/DAY)
RATED CAPACITY:	70.00	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
THUNDER BAY SOUTH	43,420

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) SAMPLE DAY CONDITIONS 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)	
			PRE CHLORINATION	CORROSION CONTROL
DATE	DELAY * TIME(HRS)	FLOW (1000M3)	CHLORINE	SODIUM SILICATE
JAN 09	2.50	28.920	3.63	9.10
FEB 14	2.47	30.900	3.13	9.91
MAR 13	2.44	31.440	3.04	9.00
APR 10	2.56	28.800	3.16	10.23
JUN 12	3.31	33.040	3.28	6.96
JUL 10	2.23	34.330	2.00	8.05
SEP 11	2.24	34.050	3.93	13.65
OCT 10	2.17	35.134	3.49	11.71
NOV 14	2.50	30.520	3.37	10.46
DEC 11	2.32	32.950	2.63	11.86

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
AEROMONAS SP	.	.	.	.	.	.	.	.	.	1	0	0
FECAL COLIFORM MF	4	0	0	.	.	.	.	.	.	.	.	.
FECAL COLIFORM	.	.	.	4	0	0	1	0	0	4	0	0
FECAL STREPTO MF	0	0	0	.	.	.	.	.	.	.	.	.
FECAL STREPTOCOCCUS	.	.	.	.	.	.	.	.	.	1	0	0
STANDRD PLATE CNT MF	.	.	.	4	2	0	1	1	0	4	3	0
PSEUDOMON AERUGINOSA	.	.	.	.	.	.	.	.	.	1	0	0
STAPH AUREUS	.	.	.	.	.	.	.	.	.	1	0	0
COLIFORM	.	.	.	4	0	0	1	0	0	4	1	0
TOTAL COLIFORM MF	4	2	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	8	2	0	12	2	0	3	1	0	16	4	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	10	10	0	5	5	0	14	9	0
FLD CHLORINE FREE	.	.	.	11	11	0	5	5	0	15	7	0
FLD CHLORINE (TOTAL)	.	.	.	11	11	0	5	5	0	13	9	0
FLD PH	9	9	0	10	10	0	5	5	0	13	13	0
FLD TEMPERATURE	10	10	0	11	11	0	5	5	0	8	8	0
FLD TURBIDITY	2	2	0	2	2	0	.	.	.	.	.	.
*TOTAL SCAN CHEMISTRY (FLD)	21	21	0	55	55	0	25	25	0	63	46	0
CHEMISTRY (LAB)												
ALKALINITY	11	11	0	11	11	0	10	10	0	22	22	0
CALCIUM	11	11	0	11	11	0	10	10	0	22	22	0
CYANIDE	11	0	0	11	0	0	.	.	.	.	.	.
CHLORIDE	11	1	8	11	11	0	10	10	0	22	22	0
COLOUR	11	11	0	11	11	0	10	10	0	22	22	0
CONDUCTIVITY	11	11	0	11	11	0	10	10	0	22	22	0
DISS ORG CARBON	11	11	0	11	11	0	10	10	0	22	22	0
FLUORIDE	11	0	8	11	0	8	10	0	6	22	2	15
HARDNESS	11	11	0	11	11	0	10	10	0	22	22	0
IONCAL	11	11	0	11	11	0	10	10	0	22	22	0
LANGELIERS INDEX	0	0	0	0	0	0	0	0	0	0	0	0
MAGNESIUM	11	11	0	11	11	0	10	10	0	22	22	0
SODIUM	11	6	5	11	11	0	10	10	0	22	22	0
AMMONIUM TOTAL	11	0	2	11	0	4	10	4	1	22	0	3
NITRITE	11	2	7	11	2	6	10	2	8	22	2	16
TOTAL NITRATES	11	9	2	11	9	2	10	5	5	22	19	3
NITROGEN TOT KJELD	11	11	0	11	11	0	10	10	0	22	22	0
PH	11	11	0	11	11	0	10	10	0	22	22	0
PHOSPHORUS FIL REACT	11	0	3	11	0	7	.	.	.	.	.	.
PHOSPHORUS TOTAL	11	0	9	11	0	10	.	.	.	.	.	.
SULPHATE	11	11	0	11	11	0	10	10	0	22	22	0
TURBIDITY	11	11	0	11	11	0	10	10	0	22	22	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
*TOTAL SCAN CHEMISTRY (LAB)	231	150	44	231	165	37	180	151	20	396	331	37
METALS												
SILVER	11	0	0	11	0	0	10	0	1	22	0	3
ALUMINUM	11	11	0	11	11	0	10	10	0	22	22	0
ARSENIC	11	0	11	11	0	10	10	0	8	22	0	22
BARIUM	11	11	0	11	11	0	10	10	0	22	22	0
BORON	11	1	10	11	1	10	10	0	10	22	2	20
BERYLLIUM	11	0	0	11	0	0	10	0	0	22	0	0
CADMIUM	11	0	1	11	0	1	10	0	5	22	0	0
COBALT	11	0	11	11	0	11	10	0	10	22	0	20
CHROMIUM	11	0	5	11	0	3	10	0	2	22	1	8
COPPER	11	2	9	11	0	11	10	10	0	22	19	3
IRON	11	0	11	11	0	11	10	1	9	22	0	22
MERCURY	11	2	0	11	0	1	.	.	.	.	.	.
MANGANESE	11	11	0	11	11	0	10	10	0	22	22	0
MOLYBDENUM	11	0	10	11	0	10	10	0	8	22	0	20
NICKEL	11	0	8	11	0	4	10	0	8	22	0	3
LEAD	11	0	11	11	0	8	10	10	0	22	11	11
ANTIMONY	11	0	11	11	0	11	10	1	9	22	3	19
SELENIUM	11	0	0	11	0	1	10	0	1	22	0	0
STRONTIUM	11	11	0	11	11	0	10	10	0	22	22	0
TITANIUM	11	2	9	11	11	0	10	10	0	22	22	0
THALLIUM	11	0	0	11	0	0	10	0	0	22	0	0
URANIUM	11	0	0	11	0	0	10	0	0	22	0	0
VANADIUM	11	0	11	11	0	10	10	0	10	22	0	21
ZINC	11	1	10	11	0	11	10	10	0	22	7	15
*TOTAL SCAN METALS	264	52	128	264	56	113	230	82	81	506	153	187
*TOTAL GROUP INORGANIC & PHYSICAL	516	223	172	550	276	150	435	258	101	965	530	224
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	11	0	0	11	0	0	5	0	0	8	0	0
123 TRICHLOROBENZENE	11	0	0	11	0	0	5	0	0	8	0	0
1234 T-CHLOROBENZENE	11	0	0	11	0	0	5	0	0	8	0	0
1235 T-CHLOROBENZENE	11	0	0	11	0	0	5	0	0	8	0	0
124 TRICHLOROBENZENE	11	0	0	11	0	0	5	0	0	8	0	0
1245 T-CHLOROBENZENE	11	0	0	11	0	0	5	0	0	8	0	0
135 TRICHLOROBENZENE	11	0	0	11	0	0	5	0	0	8	0	0
HCB	11	0	0	11	0	0	5	0	0	8	0	0
HEXACHLOROETHANE	11	0	0	11	0	0	5	0	0	8	0	0
OCTACHLOROSTYRENE	11	0	0	11	0	0	5	0	0	8	0	0
PENTACHLOROBENZENE	11	0	0	11	0	0	5	0	0	8	0	0
236 TRICHLOROTOLUENE	11	0	0	11	0	0	5	0	0	8	0	0
245 TRICHLOROTOLUENE	11	0	0	11	0	0	5	0	0	8	0	0
26A TRICHLOROTOLUENE	11	0	0	11	0	0	5	0	0	8	0	0
*TOTAL SCAN CHLOROAROMATICS	154	0	0	154	0	0	70	0	0	112	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROPHENOLS												
234 TRICHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	6	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	9	0	0	9	0	0	1	0	0	1	0	0
ANTHRACENE	8	0	0	8	0	0	1	0	0	1	0	0
FLUORANTHENE	10	0	0	10	0	0	1	0	0	1	0	0
PYRENE	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(A)ANTHRACENE	10	0	0	10	0	0	1	0	0	1	0	0
CHRYSENE	10	0	0	10	0	0	1	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	9	0	0	9	0	0	1	0	0	1	0	0
BENZO(E) PYRENE	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(B) FLUORANTHEN	10	0	0	10	0	0	1	0	0	1	0	0
PERYLENE	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(K) FLUORANTHEN	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(A) PYRENE	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(G,H,I) PERYLEN	10	0	0	10	0	0	1	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	10	0	0	10	0	0	1	0	0	1	0	0
INDENO(1,2,3-C,D) PY	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(B) CHRYSENE	10	0	0	10	0	0	1	0	0	1	0	0
CORONENE	10	0	0	10	0	0	1	0	0	1	0	0
*TOTAL SCAN PAH	166	0	0	166	0	0	17	0	0	17	0	0
PESTICIDES & PCB												
ALDRIN	11	0	0	11	0	0	5	0	0	8	0	0
ALPHA BHC	11	0	6	11	0	6	5	0	1	8	0	4
BETA BHC	11	0	0	11	0	0	5	0	0	8	0	0
LINDANE	11	0	0	11	0	0	5	0	0	8	0	0
ALPHA CHLORDANE	11	0	0	11	0	0	5	0	0	8	0	0
GAMMA CHLORDANE	11	0	0	11	0	0	5	0	0	8	0	0
DIELDRIN	11	0	0	11	0	0	5	0	0	8	0	0
METHOXYCHLOR	11	0	0	11	0	0	5	0	0	8	0	0
ENDOSULFAN 1	11	0	0	11	0	0	5	0	0	8	0	0
ENDOSULFAN II	11	0	0	11	0	0	5	0	0	8	0	0
ENDRIN	11	0	0	11	0	0	5	0	0	8	0	0
ENDOSULFAN SULPHATE	11	0	0	11	0	0	5	0	0	8	0	0
HEPTACHLOR EPOXIDE	11	0	0	11	0	0	5	0	0	8	0	0
HEPTACHLOR	11	0	0	11	0	0	5	0	0	8	0	0
MIREX	11	0	0	11	0	0	5	0	0	8	0	0
OXYCHLORDANE	11	0	0	11	0	0	5	0	0	8	0	0
OPDDT	11	0	0	11	0	0	5	0	0	8	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN	RAW			TREATED			SITE 1			SITE 2		
PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PCB	11	0	0	11	0	0	5	0	0	8	0	0
DDD	11	0	0	11	0	0	5	0	0	8	0	0
PPDDE	11	0	0	11	0	0	5	0	0	8	0	0
PPDDT	11	0	0	11	0	0	5	0	0	8	0	0
AMETRINE	10	0	0	11	0	0	.	.	.	.	.	.
ATRAZINE	10	0	0	11	0	0	.	.	.	.	.	.
ATRATONE	10	0	0	11	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	10	0	0	11	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	10	0	0	11	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	9	0	0	10	0	0	.	.	.	.	.	.
PROMETONE	10	0	0	11	0	0	.	.	.	.	.	.
PROPAZINE	10	0	0	11	0	0	.	.	.	.	.	.
PROMETRYNE	10	0	0	11	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	9	0	0	10	0	0	.	.	.	.	.	.
SIMAZINE	10	0	0	11	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	10	0	0	11	0	0	.	.	.	.	.	.
METOLACHLOR	10	0	0	11	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	3	2	0	1	1	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	362	0	6	375	2	6	106	1	1	170	0	4
PHENOLICS												
PHENOLICS	11	2	5	11	2	6	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	11	2	5	11	2	6	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	11	0	0	11	0	0	5	0	0	8	0	0
2,4,5-T	2	0	0	1	0	0	.	.	.	.	.	.
2,4-D	2	0	0	1	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	1	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	1	0	0	.	.	.	.	.	.
DICAMBA	1	0	0	0	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	1	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.	.	.	.
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	62	0	0	56	0	0	5	0	0	8	0	0
VOLATILES												
BENZENE	10	0	1	10	0	2	5	0	0	10	0	0
TOLUENE	10	0	0	10	0	0	5	0	0	10	0	1
ETHYLBENZENE	10	0	4	10	0	4	5	0	4	10	0	8
P-XYLENE	10	0	0	10	0	0	5	0	0	10	0	0
M-XYLENE	10	0	0	10	0	0	5	0	0	10	0	0
O-XYLENE	10	0	0	10	0	0	5	0	0	10	0	0
STYRENE	10	0	7	10	0	8	5	0	5	10	0	10
1,1 DICHLOROETHYLENE	10	0	0	10	0	0	5	0	0	10	0	0
METHYLENE CHLORIDE	10	0	0	10	0	0	5	0	0	10	0	0
T1,2DICHLOROETHYLENE	10	0	0	10	0	0	5	0	0	10	0	0
1,1 DICHLOROETHANE	10	0	0	10	0	0	5	0	0	10	0	0
CHLOROFORM	10	0	0	10	10	0	5	5	0	10	10	0
111, TRICHLOROETHANE	10	0	0	10	0	0	5	0	0	10	0	1
1,2 DICHLOROETHANE	10	0	0	10	0	0	5	0	0	10	0	0
CARBON TETRACHLORIDE	10	0	0	10	0	0	5	0	0	10	0	0
1,2 DICHLOROPROPANE	10	0	0	10	0	0	5	0	0	10	0	0
TRICHLOROETHYLENE	10	0	0	10	0	0	5	0	0	10	0	0
DICHLOROBROMOMETHANE	10	0	0	10	10	0	5	5	0	10	10	0
112 TRICHLOROETHANE	10	0	0	10	0	0	5	0	0	10	0	0
CHLORODIBROMOMETHANE	10	0	0	10	0	0	5	0	0	10	0	0
T-CHLOROETHYLENE	10	0	0	10	0	2	5	0	2	10	0	3
BROMOFORM	10	0	0	10	0	0	5	0	0	10	0	0
1122 T-CHLOROETHANE	10	0	0	10	0	0	5	0	0	10	0	0
CHLOROBENZENE	10	0	0	10	0	0	5	0	0	10	0	0
1,4 DICHLOROBENZENE	10	0	0	10	0	0	5	0	0	10	0	0
1,3 DICHLOROBENZENE	10	0	0	10	0	0	5	0	0	10	0	0
1,2 DICHLOROBENZENE	10	0	0	10	0	0	5	0	0	10	0	0
ETHLYENE DIBROMIDE	10	0	0	10	0	0	5	0	0	10	0	0
TOTL TRIHALOMETHANES	10	0	0	10	10	0	5	5	0	10	10	0
*TOTAL SCAN VOLATILES	290	0	12	290	30	16	145	15	11	290	30	23
*TOTAL GROUP ORGANIC	1057	2	23	1058	34	28	343	16	12	597	30	27

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than the Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(TO6) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
AERONONAS SP (CT/100ML)			DET'N LIMIT = N/A	GUIDELINE = 0 (A1)		
JUL	.	.	.	.	0	.
FECAL COLIFORM (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)		
JUL	.	0	.	.	0	.
SEP	.	0	.	0	0	.
OCT	.	0	.	.	.	0
DEC	.	0	.	.	0	.
FECAL STREPTOCOCCUS (CT/100ML)			DET'N LIMIT = N/A	GUIDELINE = 0 (A1)		
JUL	.	.	.	.	0	.
STANDRD PLATE CNT MF (COUNT/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)		
JUL	.	0	.	.	3	.
SEP	.	1	.	1	3	.
OCT	.	0	.	.	.	0
DEC	.	8	.	.	3	.
PSEUDOMON AERUGINOSA (CT/100ML)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JUL	.	.	.	.	0	.
STAPH AUREUS (CT/100ML)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JUL	.	.	.	.	0	.
COLIFORM (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A		
JUL	.	0	.	.	1	.
SEP	.	0	.	0	0	.
OCT	.	0	.	.	.	0
DEC	.	0	.	.	0	.
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)		
JUL	BDL	.	.	.	.	.
SEP	BDL	.	.	.	.	.
OCT	4	.	.	.	.	.
DEC	4	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	.	.	.	.150	.200
FEB	.	.200	.	.	.	.
MAR	.	1.200	.	.	.	.100
APR	.	.100	.	.	.	.100
MAY	.	.160	.	.400	.000	.150
JUN	.	.300	.300	.	.000	.100
JUL	.	.200	.100	.	.	.
SEP	.	.200	.600	.	.000	.100
OCT	.	.230	.400	.	.000	.100
NOV	.	.300	.	.	.000	.100
DEC	.	.200	.	.	.	.
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	2.000	.	.	.000	.000
FEB	.	1.500	.	.	.	.
MAR	.	1.400	.	.	.000	.100
APR	.	1.500	.	.	.	.100
MAY	.	1.380	.	.300	.000	.050
JUN	.	1.100	.500	.	.000	.100
JUL	.	1.700	.200	.	.	.
SEP	.	1.500	.100	.	.000	.050
OCT	.	1.970	.900	.	.000	.150
NOV	.	1.300	.	.	.000	.200
DEC	.	1.200	.	.	.	.
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	2.000	.	.	.150	.200
FEB	.	1.700	.	.	.	.
MAR	.	1.600	.	.	.	.200
APR	.	1.600	.	.	.	.200
MAY	.	1.540	.	.700	.000	.200
JUN	.	1.400	.800	.	.000	.200
JUL	.	1.900	.300	.	.	.
SEP	.	1.700	.700	.	.000	.150
OCT	.	2.200	1.100	.	.000	.250
NOV	.	1.600	.	.	.	.300
DEC	.	1.400	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM				
	RAW	TREATED	SITE 1		SITE 2		
			STANDING	FREE FLOW	STANDING	FREE FLOW	
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)			
JAN	6.800	7.600	.	.	7.700	8.300	.
FEB	6.900	7.900	.	.	.	.	.
MAR	6.900	7.600	.	.	8.400	8.200	.
APR	7.100	7.700	.	.	8.300	.	.
MAY	.	8.300	.	7.400	7.800	8.000	.
JUN	7.100	7.700	7.400	.	7.900	7.900	.
JUL	7.100	7.700	7.200	.	.	.	.
SEP	7.000	7.500	7.500	.	7.900	7.900	.
OCT	7.000	7.800	7.800	.	8.400	8.100	.
DEC	6.800	7.600	.	.	.	.	.
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)			
JAN	4.000	4.000	.	.	.	.	.
FEB	2.000	3.000	.	.	.	.	.
MAR	2.000	3.000	.	.	17.000	4.000	.
APR	3.000	3.000	.	.	.	.	.
MAY	.	5.000	.	3.000	.	.	.
JUN	9.000	9.000	7.000	.	.	.	.
JUL	10.000	10.000	9.500	.	.	.	.
SEP	14.000	14.000	14.000	.	20.000	14.000	.
OCT	12.000	12.000	12.000	.	12.000	11.000	.
NOV	5.000	5.000	.	.	12.000	6.000	.
DEC	3.000	3.000	.	.	.	.	.
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)			
FEB	.250	.	.	.	.	.	.
MAY	.	.300	.	.	.	.	.
OCT	.340	.340	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM				
	RAW	TREATED	SITE 1		SITE 2		
			STANDING	FREE FLOW	STANDING	FREE FLOW	
CHEMISTRY (LAB)							
ALKALINITY (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A3)		
JAN	21.700	21.500	.	.	26.600	27.100	.
FEB	22.000	22.800	.	.	28.400	28.000	.
MAR	21.500	22.000	.	.	28.100	27.500	.
APR	21.400	22.400	.	.	28.100	27.600	.
MAY	21.300	22.100	22.400	21.800	25.600	26.000	.
JUN	21.000	20.900	22.200	21.100	25.500	25.300	.
JUL	21.300	20.900	22.200	20.800	27.100	25.600	.
SEP	21.300	23.000	24.000	23.100	27.200	27.700	.
OCT	21.400	22.500	23.200	22.800	28.200	27.400	.
NOV	20.000	21.100	.	.	24.600	26.100	.
DEC	21.200	23.200	.	.	27.600	28.100	.
CALCIUM (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)		
JAN	8.600	8.600	.	.	11.400	11.900	.
FEB	7.600	7.700	.	.	11.300	11.500	.
MAR	7.400	7.400	.	.	11.400	11.800	.
APR	7.800	8.000	.	.	12.000	11.600	.
MAY	6.500	6.600	6.500	6.700	9.400	9.000	.
JUN	6.600	6.600	6.600	6.600	9.200	9.400	.
JUL	7.400	7.400	8.200	7.400	12.800	11.400	.
SEP	6.000	6.100	6.700	6.400	10.300	10.200	.
OCT	6.900	6.500	6.600	6.300	10.700	10.100	.
NOV	7.200	7.200	.	.	9.600	10.000	.
DEC	6.800	6.800	.	.	10.500	10.600	.
CHLORIDE (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)		
JAN	1.000	2.900	.	.	3.000	3.000	.
FEB	BDL	2.400	.	.	2.700	2.700	.
MAR	.500 <T	2.700	.	.	2.900	2.900	.
APR	.500 <T	2.600	.	.	2.800	2.800	.
MAY	.400 <T	2.400	2.600	2.400	2.500	2.500	.
JUN	.800 <T	2.800	3.100	2.900	3.000	2.800	.
JUL	BDL	2.600	2.800	2.600	3.100	3.300	.
SEP	.700 <T	2.800	3.200	2.500	2.600	2.700	.
OCT	.400 <T	3.100	2.900	3.200	3.100	3.100	.
NOV	.400 <T	2.300	.	.	2.600	2.300	.
DEC	.800 <T	2.600	.	.	2.600	2.700	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
JAN	13.000	7.000	.	.	8.500	8.000 .
FEB	13.000	7.500	.	.	9.000	8.500 .
MAR	12.500	7.000	.	.	9.000	8.000 .
APR	13.500	8.000	.	.	8.500	8.000 .
MAY	13.000	7.500	9.000	8.500	8.500	7.500 .
JUN	13.500	7.500	8.000	8.000	8.500	8.000 .
JUL	12.500	7.000	10.000	8.000	7.500	6.000 .
SEP	12.000	6.000	6.500	7.000	6.500	7.000 .
OCT	11.000	5.500	6.500	6.000	6.500	6.000 .
NOV	12.000	6.000	.	.	8.000	7.500 .
DEC	12.000	7.500	.	.	8.500	- .
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
JAN	59	68	.	.	78	79 .
FEB	58	68	.	.	79	78 .
MAR	59	68	.	.	81	80 .
APR	60	71	.	.	81	81 .
MAY	58	67	69	67	74	75 .
JUN	57	65	68	66	75	74 .
JUL	58	67	69	66	80	79 .
SEP	58	71	73	71	79	80 .
OCT	58	71	73	72	83	82 .
NOV	59	69	.	.	84	83 .
DEC	59	70	.	.	79	80 .
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
JAN	5.100	5.000	.	.	5.000	4.900 .
FEB	4.900	5.000	.	.	4.800	4.800 .
MAR	5.100	5.100	.	.	5.000	5.100 .
APR	5.100	5.100	.	.	5.000	4.900 .
MAY	4.900	4.900	4.900	4.700	4.900	4.900 .
JUN	5.000	5.000	4.800	4.900	4.800	4.900 .
JUL	4.900	5.000	5.100	5.200	4.900	5.000 .
SEP	4.900	4.900	5.200	5.100	4.800	5.200 .
OCT	5.100	5.100	5.300	5.000	4.800	5.000 .
NOV	4.900	4.800	.	.	4.600	4.700 .
DEC	4.800	4.800	.	.	4.800	4.900 .

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
JAN	.020 <T	.020 <T	.	.	.020 <T	.020 <T
FEB	.020 <T	.020 <T	.	.	.020 <T	.020 <T
MAR	BDL	BDL	.	.	BDL	BDL
APR	.020 <T	.020 <T	.	.	.020 <T	.020 <T
MAY	.020 <T	BDL	.020 <T	.020 <T	.020 <T	.020 <T
JUN	.020 <T	.020 <T	.020 <T	.040 <T	.060	.060
JUL	.020 <T	.020 <T	.020 <T	.020 <T	.020 <T	.020 <T
SEP	.020 <T	BDL	BDL	BDL	BDL	.020 <T
OCT	.020 <T	.020 <T	BDL	BDL	.020 <T	BDL
NOV	BDL	.020 <T	.	.	.020 <T	BDL
DEC	BDL	.020 <T	.	.	.020 <T	.020 <T
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
JAN	31.400	31.400	.	.	35.900	36.100
FEB	30.000	30.000	.	.	35.300	35.700
MAR	29.000	29.000	.	.	35.000	37.000
APR	31.000	31.000	.	.	36.000	36.000
MAY	25.800	26.200	26.300	26.600	30.600	29.400
JUN	28.000	28.000	27.000	28.000	31.000	31.000
JUL	30.000	29.000	32.000	29.000	38.000	36.000
SEP	25.500	25.600	27.900	26.600	32.400	32.100
OCT	27.000	26.300	26.100	25.900	32.700	31.900
NOV	28.000	28.000	.	.	30.000	31.000
DEC	27.300	27.700	.	.	32.300	32.300
IONCAL (DIMENSIONS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JAN	14.690	12.610	.	.	12.220	11.510
FEB	16.720	12.820	.	.	9.111	11.440
MAR	11.880	11.290	.	.	8.539	14.380
APR	17.540	16.150	.	.	11.790	10.390
MAY	2.078	1.501	.145	3.574	3.072	2.778
JUN	4.744	9.246	.035	6.135	3.478	3.231
JUL	15.840	12.020	16.990	14.370	19.880	14.800
SEP	.346	3.875	5.516	6.833	11.540	9.093
OCT	.864	1.742	1.241	.189	4.119	4.981
NOV	13.150	13.200	.	.	8.185	8.297
DEC	1.433	2.879	.	.	5.689	3.779

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
LANGELIERS INDEX (DIMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A	
JAN	-1.468	-1.506	.	.	-1.086	-1.049
FEB	-1.445	-1.419	.	.	-1.032	-1.030
MAR	-1.537	-1.511	.	.	-.933	-.957
APR	-1.617	-1.531	.	.	-.931	-.913
MAY	-1.687	-1.559	-1.700	-1.628	-1.244	-1.137
JUN	-1.566	-1.582	-1.547	-1.558	-1.186	-1.159
JUL	-1.461	-1.493	-1.513	-1.495	-.978	-1.103
SEP	-1.572	-1.477	-1.689	-1.615	-1.101	-1.037
OCT	-1.559	-1.499	-1.500	-1.477	-.970	-1.047
NOV	-1.580	-1.562	.	.	-1.077	-1.053
DEC	-1.610	-1.526	.	.	-1.096	-1.054
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10		GUIDELINE = 30 (F2)	
JAN	2.400	2.300	.	.	1.800	1.550
FEB	2.700	2.650	.	.	1.700	1.700
MAR	2.700	2.600	.	.	1.700	1.800
APR	2.800	2.700	.	.	1.600	1.600
MAY	2.350	2.350	2.450	2.450	1.750	1.650
JUN	2.700	2.800	2.600	2.700	2.000	1.800
JUL	2.700	2.500	2.700	2.600	1.600	1.800
SEP	2.550	2.550	2.700	2.600	1.650	1.600
OCT	2.400	2.450	2.350	2.450	1.450	1.600
NOV	2.500	2.500	.	.	1.400	1.400
DEC	2.500	2.600	.	.	1.500	1.400
SODIUM (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 200 (A4)	
JAN	1.100	2.300	.	.	2.700	2.800
FEB	1.800	3.500	.	.	3.600	3.600
MAR	1.000 <T	3.000	.	.	3.000	3.000
APR	1.200	3.000	.	.	3.000	3.000
MAY	.700 <T	2.800	2.700	2.600	2.600	2.500
JUN	.800 <T	2.600	2.400	2.400	2.600	2.400
JUL	1.000	2.600	2.800	2.800	2.800	2.800
SEP	1.300	3.900	3.900	3.700	3.900	4.000
OCT	1.000	3.600	3.500	3.400	3.500	3.600
NOV	1.000 <T	3.000	.	.	3.600	3.400
DEC	.700 <T	2.900	.	.	3.300	3.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
JAN	BDL	.002 <T	.	.	BDL	BDL
FEB	BDL	BDL	.	.	BDL	BDL
MAR	BDL	BDL	.	.	BDL	BDL
APR	BDL	.002 <T	.	.	BDL	BDL
MAY	BDL	BDL	.096	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	.012	BDL	BDL	BDL
SEP	BDL	BDL	.016	BDL	BDL	BDL
OCT	.002 <T	.004 <T	.010	.008 <T	.002 <T	.002 <T
NOV	.002 <T	.008 <T	.	.	BDL	.002 <T
DEC	BDL	BDL	.	.	BDL	BDL
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
JAN	.002 <T	.002 <T	.	.	.003 <T	.002 <T
FEB	.001 <T	.001 <T	.	.	.001 <T	.001 <T
MAR	.007	.005	.	.	.009	.014
APR	BDL	BDL	.	.	.001 <T	BDL
MAY	.002 <T	.002 <T	.007	.002 <T	.003 <T	.003 <T
JUN	.001 <T	.001 <T	.004 <T	.008	.004 <T	.002 <T
JUL	.002 <T	.002 <T	.003 <T	.003 <T	.002 <T	.003 <T
SEP	.005	.005	.004 <T	.001 <T	.003 <T	.002 <T
OCT	.001 <T	BDL	.001 <T	.001 <T	.001 <T	BDL
NOV	.002 <T	.001 <T	.	.	.001 <T	.001 <T
DEC	BDL	BDL	.	.	BDL	BDL
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
JAN	.060	.070	.	.	.070	.065
FEB	.065	.075	.	.	.075	.070
MAR	.075	.085	.	.	.085	.090
APR	.065	.070	.	.	.070	.070
MAY	.075	.075	.205	.075	.075	.075
JUN	.040	.035	.050	.030	.035	.040
JUL	.050	.035	.020 <T	.015 <T	.025	.030
SEP	.020 <T	.020 <T	.045	.020 <T	.025	.020 <T
OCT	.020 <T	.020 <T	.020 <T	.015 <T	.015 <T	.015 <T
NOV	.050	.055	.	.	.045	.045
DEC	.065	.050	.	.	.065	.055

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
NITROGEN TOT KJELD (MG/L)			**DET'N LIMIT = 0.02**		**GUIDELINE = N/A**	
JAN	.270	.260	.	.	.270	.250
FEB	.220	.230	.	.	.230	.220
MAR	.220	.230	.	.	.230	.220
APR	.180	.180	.	.	.170	.190
MAY	.210	.180	.370	.210	.200	.200
JUN	.260	.240	.250	.220	.220	.210
JUL	.270	.310	.390	.240	.250	.260
SEP	.210	.220	.330	.210	.200	.220
OCT	.250	.250	.290	.230	.210	.230
NOV	.220	.230	.	.	.210	.210
DEC	.160	.160	.	.	.170	.180
PH (DMNSLESS)			**DET'N LIMIT = N/A**		**GUIDELINE = 6.5-8.5(A4)**	
JAN	7.600	7.570	.	.	7.780	7.790
FEB	7.670	7.680	.	.	7.810	7.810
MAR	7.600	7.620	.	.	7.910	7.880
APR	7.500	7.560	.	.	7.890	7.930
MAY	7.510	7.620	7.480	7.550	7.720	7.840
JUN	7.630	7.620	7.630	7.640	7.790	7.810
JUL	7.680	7.660	7.570	7.660	7.830	7.780
SEP	7.660	7.720	7.450	7.560	7.800	7.860
OCT	7.610	7.680	7.660	7.710	7.900	7.860
NOV	7.600	7.600	.	.	7.900	7.880
DEC	7.570	7.620	.	.	7.790	7.820
PHOSPHORUS FIL REACT (MG/L)			**DET'N LIMIT = 0.0005**		**GUIDELINE = N/A**	
JAN	BDL	.001 <T	.	.	.	.
FEB	BDL	.000 <T	.	.	.	.
MAR	BDL	.001 <T	.	.	.	.
APR	.001 <T	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUN	BDL	.000 <T	.	.	.	.
JUL	.000 <T	.000 <T	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
NOV	BDL	.001 <T	.	.	.	.
DEC	.001 <T	.001 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM				
	RAW	TREATED	SITE 1		SITE 2		
			STANDING	FREE FLOW	STANDING	FREE FLOW	
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)		
JAN	.007 <T	.007 <T	.	.	.	.	.
FEB	.004 <T	.004 <T	.	.	.	.	.
MAR	.004 <T	.004 <T	.	.	.	.	.
APR	.004 <T	.005 <T	.	.	.	.	.
MAY	.004 <T	.005 <T	.	.	.	.	.
JUN	.005 <T	.003 <T	.	.	.	.	.
JUL	.003 <T	.007 <T	.	.	.	.	.
SEP	BDL	.002 <T	.	.	.	.	.
OCT	.004 <T	.003 <T	.	.	.	.	.
NOV	.005 <T	.006 <T	.	.	.	.	.
DEC	BDL	BDL	.	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 500 (A3)		
JAN	5.840	5.830	.	.	5.850	5.990	.
FEB	6.610	6.710	.	.	6.670	6.710	.
MAR	5.670	5.720	.	.	5.910	5.760	.
APR	6.000	5.820	.	.	5.950	6.030	.
MAY	5.620	5.760	5.540	5.650	5.600	5.610	.
JUN	5.490	5.590	5.400	5.380	5.510	5.330	.
JUL	5.690	5.780	5.770	6.050	5.420	5.920	.
SEP	5.600	5.660	5.570	5.570	5.540	5.520	.
OCT	6.710	6.350	5.770	5.560	5.810	5.670	.
NOV	5.910	5.960	.	.	6.010	5.450	.
DEC	5.580	5.740	.	.	5.680	5.810	.
TURBIDITY (FTU)			DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)		
JAN	.380	.310	.	.	.480	.340	.
FEB	.340	.370	.	.	.390	.460	.
MAR	.640	.850	.	.	.580	.380	.
APR	1.400	.840	.	.	.620	.700	.
MAY	.430	.950	.850	.590	.650	.440	.
JUN	.830	.820	1.050	.850	.650	.550	.
JUL	.510	.960	1.400	.380	.490	.400	.
SEP	1.100	.740	.770	.400	.400	.420	.
OCT	.650	.520	.610	.540	.540	.480	.
NOV	.570	.550	.	.	.640	.530	.
DEC	.840	1.050	.	.	.680	.520	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
SILVER (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 50 (A1)	
JAN	BDL	BDL	.	.	BDL	BDL
FEB	BDL	BDL	.	.	BDL	BDL
MAR	BDL	BDL	.	.	BDL	BDL
APR	BDL	BDL	.	.	.060 <T	.060 <T
MAY	BDL	BDL	BDL	BDL	.080 <T	BDL
JUN	BDL	BDL	.100 <T	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.	.	BDL	BDL
DEC	BDL	BDL	.	.	BDL	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)	
JAN	8.300	13.000	.	.	13.000	12.000
FEB	7.300	14.000	.	.	13.000	13.000
MAR	7.300	14.000	.	.	14.000	14.000
APR	11.000	17.000	.	.	14.000	16.000
MAY	15.000	39.000	37.000	36.000	34.000	35.000
JUN	8.900	13.000	15.000	9.500	12.000	12.000
JUL	9.800	19.000	13.000	11.000	14.000	14.000
SEP	8.200	15.000	13.000	9.500	15.000	15.000
OCT	7.700	12.000	9.300	8.800	10.000	12.000
NOV	9.000	13.000	.	.	10.000	9.800
DEC	7.900	12.000	.	.	9.500	9.100
ARSENIC (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 25 (A1)	
JAN	.300 <T	.360 <T	.	.	.400 <T	.290 <T
FEB	.360 <T	.220 <T	.	.	.260 <T	.370 <T
MAR	.300 <T	.290 <T	.	.	.290 <T	.300 <T
APR	.430 <T	.340 <T	.	.	.280 <T	.330 <T
MAY	.240 <T	.200 <T	BDL	.330 <T	.450 <T	.210 <T
JUN	.290 <T	.340 <T	.330 <T	.320 <T	.180 <T	.250 <T
JUL	.400 <T	.250 <T	.380 <T	.270 <T	.340 <T	.290 <T
SEP	.120 <T	BDL	.160 <T	BDL	.140 <T	.450 <T
OCT	.300 <T	.370 <T	.380 <T	.340 <T	.300 <T	.280 <T
NOV	.400 <T	.320 <T	.	.	.440 <T	.430 <T
DEC	.240 <T	.250 <T	.	.	.270 <T	.220 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
JAN	5.400	5.400	.	.	5.100	4.900
FEB	6.200	6.000	.	.	5.100	5.200
MAR	5.300	5.300	.	.	5.600	4.600
APR	5.500	5.500	.	.	5.100	4.600
MAY	5.300	5.300	6.000	5.200	5.600	4.800
JUN	5.100	5.200	5.900	5.500	5.900	4.900
JUL	5.700	5.700	6.700	6.000	6.500	6.400
SEP	5.000	5.300	5.200	4.700	5.200	5.100
OCT	5.000	5.200	4.600	4.500	4.600	5.000
NOV	5.200	5.000	.	.	5.000	4.700
DEC	4.800	4.900	.	.	4.500	3.900
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
JAN	6.100 <T	6.400 <T	.	.	6.900 <T	5.600 <T
FEB	7.200 <T	7.000 <T	.	.	7.100 <T	7.400 <T
MAR	8.400 <T	10.000 <T	.	.	10.000 <T	9.800 <T
APR	7.400 <T	7.200 <T	.	.	6.400 <T	7.200 <T
MAY	25.000	23.000	7.600 <T	7.100 <T	24.000	24.000
JUN	8.100 <T	7.700 <T	7.900 <T	7.400 <T	7.900 <T	7.700 <T
JUL	7.200 <T	5.900 <T	5.400 <T	7.000 <T	7.500 <T	7.300 <T
SEP	8.600 <T	6.500 <T	9.000 <T	7.800 <T	9.100 <T	9.100 <T
OCT	6.200 <T	5.900 <T	6.200 <T	5.300 <T	6.000 <T	6.100 <T
NOV	4.600 <T	4.200 <T	.	.	4.900 <T	5.000 <T
DEC	6.300 <T	5.900 <T	.	.	3.700 <T	5.500 <T
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.	.	BDL	BDL
FEB	BDL	BDL	.	.	BDL	BDL
MAR	BDL	BDL	.	.	BDL	BDL
APR	BDL	.060 <T	.	.	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	.060 <T	BDL	BDL
JUL	BDL	BDL	.120 <T	.080 <T	BDL	BDL
SEP	BDL	BDL	.080 <T	BDL	BDL	BDL
OCT	BDL	BDL	BDL	.060 <T	BDL	BDL
NOV	BDL	BDL	.	.	BDL	BDL
DEC	.060 <T	BDL	.	.	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
JAN	.060 <T	.080 <T	.	.	.170 <T	.050 <T
FEB	.070 <T	.070 <T	.	.	.100 <T	.070 <T
MAR	.050 <T	.080 <T	.	.	.050 <T	.060 <T
APR	.060 <T	.050 <T	.	.	.040 <T	.070 <T
MAY	.070 <T	.090 <T	.060 <T	.070 <T	.030 <T	.060 <T
JUN	.040 <T	.050 <T	.060 <T	.110 <T	.080 <T	.060 <T
JUL	.080 <T	.100 <T	.060 <T	.090 <T	.110 <T	.060 <T
SEP	.080 <T	.080 <T	.090 <T	.040 <T	.090 <T	.040 <T
OCT	.090 <T	.070 <T	.630 <T	.060 <T	.070 <T	.080 <T
NOV	.080 <T	.060 <T	.	.	.030 <T	.040 <T
DEC	.050 <T	.050 <T	.	.	BDL	BDL
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
JAN	2.700 <T	2.900 <T	.	.	6.400	3.500 <T
FEB	BDL	BDL	.	.	BDL	BDL
MAR	BDL	BDL	.	.	BDL	BDL
APR	BDL	BDL	.	.	BDL	BDL
MAY	.590 <T	BDL	BDL	BDL	.580 <T	.540 <T
JUN	.530 <T	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	.690 <T	BDL	.730 <T	BDL	.640 <T	.610 <T
OCT	BDL	.590 <T	.680 <T	BDL	.680 <T	.610 <T
NOV	BDL	BDL	.	.	BDL	BDL
DEC	.740 <T	.700 <T	.	.	BDL	.540 <T
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
JAN	2.200 <T	2.000 <T	.	.	31.000	4.900 <T
FEB	2.700 <T	2.400 <T	.	.	45.000	6.600
MAR	2.000 <T	2.000 <T	.	.	48.000	4.600 <T
APR	2.100 <T	1.900 <T	.	.	32.000	5.400
MAY	15.000	2.900 <T	360.000	110.000	77.000	8.700
JUN	2.100 <T	1.900 <T	390.000	49.000	63.000	6.600
JUL	3.000 <T	2.300 <T	840.000	110.000	62.000	11.000
SEP	2.500 <T	2.100 <T	370.000	37.000	44.000	7.000
OCT	16.000	1.900 <T	69.000	39.000	29.000	6.300
NOV	2.000 <T	1.700 <T	.	.	29.000	4.600 <T
DEC	2.800 <T	1.900 <T	.	.	27.000	6.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM				
	RAW	TREATED	SITE 1		SITE 2		
			STANDING	FREE FLOW	STANDING	FREE FLOW	
IRON (UG/L)			DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)		
JAN	21.000 <T	19.000 <T	.	.	20.000 <T	22.000 <T	.
FEB	18.000 <T	20.000 <T	.	.	31.000 <T	17.000 <T	.
MAR	18.000 <T	29.000 <T	.	.	28.000 <T	22.000 <T	.
APR	25.000 <T	28.000 <T	.	.	19.000 <T	24.000 <T	.
MAY	17.000 <T	19.000 <T	22.000 <T	35.000 <T	17.000 <T	18.000 <T	.
JUN	20.000 <T	17.000 <T	16.000 <T	24.000 <T	19.000 <T	20.000 <T	.
JUL	32.000 <T	50.000 <T	150.000	28.000 <T	24.000 <T	21.000 <T	.
SEP	28.000 <T	28.000 <T	23.000 <T	15.000 <T	31.000 <T	23.000 <T	.
OCT	29.000 <T	25.000 <T	23.000 <T	23.000 <T	21.000 <T	22.000 <T	.
NOV	28.000 <T	30.000 <T	.	.	41.000 <T	29.000 <T	.
DEC	25.000 <T	29.000 <T	.	.	24.000 <T	39.000 <T	.
MERCURY (UG/L)			DET'N LIMIT = 0.02		GUIDELINE = 1 (A1)		
JAN	.310	BDL	.	.	.	.	.
FEB	BDL	BDL	.	.	.	.	.
MAR	BDL	BDL	.	.	.	.	.
APR	BDL	BDL	.	.	.	.	.
MAY	BDL	BDL	.	.	.	.	.
JUN	BDL	BDL	.	.	.	.	.
JUL	BDL	BDL	.	.	.	.	.
SEP	BDL	BDL	.	.	.	.	.
OCT	.580	BDL	.	.	.	.	.
NOV	BDL	BDL	.	.	.	.	.
DEC	BDL	.030 <T	.	.	.	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)		
JAN	3.100	2.800	.	.	1.700	1.600	.
FEB	2.700	2.500	.	.	1.600	1.500	.
MAR	2.100	2.000	.	.	1.200	1.300	.
APR	2.500	2.600	.	.	1.200	1.400	.
MAY	2.300	2.700	2.600	3.200	1.500	1.800	.
JUN	3.900	4.600	3.700	2.900	2.400	2.800	.
JUL	5.000	15.000	6.600	2.600	2.300	2.000	.
SEP	5.100	4.800	3.000	1.700	2.000	1.900	.
OCT	4.400	3.400	2.400	2.200	1.800	1.700	.
NOV	3.700	4.300	.	.	1.800	1.900	.
DEC	3.800	4.200	.	.	2.200	2.300	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.080 <T	.100 <T	.	.	.100 <T	.130 <T .
FEB	.090 <T	.100 <T	.	.	.060 <T	.100 <T .
MAR	.080 <T	.110 <T	.	.	.100 <T	.130 <T .
APR	.060 <T	.090 <T	.	.	.110 <T	.080 <T .
MAY	.080 <T	.080 <T	BDL	.120 <T	.160 <T	.150 <T .
JUN	.060 <T	.060 <T	.090 <T	.090 <T	BDL	.080 <T .
JUL	.120 <T	.100 <T	.140 <T	.130 <T	.110 <T	.110 <T .
SEP	BDL	BDL	BDL	.090 <T	BDL	.140 <T .
OCT	.100 <T	.090 <T	.090 <T	.080 <T	.080 <T	.100 <T .
NOV	.100 <T	.080 <T	.	.	.100 <T	.080 <T .
DEC	.110 <T	.070 <T	.	.	.090 <T	.070 <T .
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
JAN	BDL	BDL	.	.	BDL	BDL .
FEB	.660 <T	.620 <T	.	.	.430 <T	.730 <T .
MAR	.390 <T	.270 <T	.	.	BDL	BDL .
APR	.220 <T	BDL	.	.	BDL	BDL .
MAY	BDL	.240 <T	.240 <T	.220 <T	BDL	BDL .
JUN	.450 <T	BDL	.470 <T	BDL	BDL	BDL .
JUL	.260 <T	BDL	1.000 <T	BDL	BDL	BDL .
SEP	BDL	BDL	.970 <T	.350 <T	BDL	.390 <T .
OCT	.250 <T	BDL	.470 <T	.240 <T	BDL	BDL .
NOV	1.000 <T	.480 <T	.	.	BDL	BDL .
DEC	.250 <T	BDL	.	.	BDL	BDL .
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
JAN	.110 <T	.060 <T	.	.	.650	.130 <T .
FEB	.220 <T	.100 <T	.	.	.610	.220 <T .
MAR	.090 <T	.070 <T	.	.	1.300	.130 <T .
APR	.090 <T	BDL	.	.	.710	.140 <T .
MAY	.110 <T	.080 <T	14.000	.560	1.400	.110 <T .
JUN	.120 <T	.110 <T	19.000	.520	1.500	.180 <T .
JUL	.350 <T	.100 <T	7.600	1.000	5.900	.250 <T .
SEP	.210 <T	BDL	92.000	.650	1.300	.160 <T .
OCT	.260 <T	.080 <T	17.000	.780	.840	.210 <T .
NOV	.250 <T	BDL	.	.	2.200	.170 <T .
DEC	.200 <T	.090 <T	.	.	1.400	.250 <T .

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM				
	RAW	TREATED	SITE 1		SITE 2		
			STANDING	FREE FLOW	STANDING	FREE FLOW	
ANTIMONY (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 146 (D4)		
JAN	.310 <T	.240 <T	.	.	.370 <T	.410 <T	.
FEB	.480 <T	.340 <T	.	.	.540	.520	.
MAR	.340 <T	.240 <T	.	.	.340 <T	.360 <T	.
APR	.290 <T	.220 <T	.	.	.300 <T	.370 <T	.
MAY	.240 <T	.190 <T	.150 <T	.340 <T	.410 <T	.290 <T	.
JUN	.350 <T	.300 <T	.360 <T	.380 <T	.520	.440 <T	.
JUL	.280 <T	.290 <T	.350 <T	.190 <T	.420 <T	.440 <T	.
SEP	.460 <T	.290 <T	.680	.410 <T	.360 <T	.360 <T	.
OCT	.370 <T	.350 <T	.270 <T	.290 <T	.400 <T	.380 <T	.
NOV	.410 <T	.370 <T	.	.	.440 <T	.440 <T	.
DEC	.420 <T	.340 <T	.	.	.420 <T	.470 <T	.
SELENIUM (UG/L)			DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)		
JAN	BDL	BDL	.	.	BDL	BDL	.
FEB	BDL	BDL	.	.	BDL	BDL	.
MAR	BDL	BDL	.	.	BDL	BDL	.
APR	BDL	BDL	.	.	BDL	BDL	.
MAY	BDL	BDL	BDL	1.100 <T	BDL	BDL	.
JUN	BDL	BDL	BDL	BDL	BDL	BDL	.
JUL	BDL	BDL	BDL	BDL	BDL	BDL	.
SEP	BDL	1.100 <T	BDL	BDL	BDL	BDL	.
OCT	BDL	BDL	BDL	BDL	BDL	BDL	.
NOV	BDL	BDL	.	.	BDL	BDL	.
DEC	BDL	BDL	.	.	BDL	BDL	.
STRONTIUM (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = N/A		
JAN	15.000	15.000	.	.	21.000	20.000	.
FEB	17.000	16.000	.	.	21.000	20.000	.
MAR	14.000	14.000	.	.	21.000	19.000	.
APR	14.000	15.000	.	.	20.000	19.000	.
MAY	14.000	15.000	15.000	14.000	19.000	18.000	.
JUN	14.000	14.000	14.000	13.000	18.000	17.000	.
JUL	15.000	14.000	15.000	15.000	21.000	20.000	.
SEP	15.000	15.000	15.000	14.000	19.000	19.000	.
OCT	15.000	14.000	14.000	13.000	18.000	19.000	.
NOV	13.000	13.000	.	.	20.000	20.000	.
DEC	13.000	13.000	.	.	18.000	17.000	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
JAN	2.000 <T	5.500	.	.	5.900	5.800
FEB	3.000 <T	8.200	.	.	8.200	7.400
MAR	3.600 <T	10.000	.	.	10.000	9.600
APR	3.300 <T	9.700	.	.	8.800	9.100
MAY	3.600 <T	9.500	8.600	9.500	9.500	8.900
JUN	5.200	16.000	16.000	16.000	17.000	17.000
JUL	3.400 <T	8.800	9.100	9.500	9.500	9.800
SEP	5.200	22.000	21.000	18.000	20.000	20.000
OCT	2.000 <T	17.000	17.000	16.000	15.000	16.000
NOV	3.800 <T	13.000	.	.	12.000	12.000
DEC	2.200 <T	8.600	.	.	9.100	8.100
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.180 <T	.180 <T	.	.	.230 <T	.220 <T
FEB	.120 <T	.230 <T	.	.	.250 <T	.440 <T
MAR	.140 <T	.160 <T	.	.	.230 <T	.210 <T
APR	.150 <T	.170 <T	.	.	.210 <T	.220 <T
MAY	.100 <T	.130 <T	.130 <T	.160 <T	.150 <T	.180 <T
JUN	.160 <T	.160 <T	.150 <T	.120 <T	.170 <T	.150 <T
JUL	.190 <T	.220 <T	.140 <T	.170 <T	.170 <T	.150 <T
SEP	.150 <T	.170 <T	.150 <T	.110 <T	.230 <T	.220 <T
OCT	.160 <T	.170 <T	.160 <T	.150 <T	.200 <T	.170 <T
NOV	.130 <T	.120 <T	.	.	.150 <T	.160 <T
DEC	.090 <T	BDL	.	.	.080 <T	BDL
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
JAN	1.500 <T	.760 <T	.	.	3.100	.960 <T
FEB	1.700 <T	1.500 <T	.	.	2.100	1.800 <T
MAR	1.100 <T	1.200 <T	.	.	1.900 <T	1.500 <T
APR	1.200 <T	1.100 <T	.	.	1.800 <T	1.800 <T
MAY	1.300 <T	.970 <T	22.000	2.300	3.400	1.200 <T
JUN	1.200 <T	1.500 <T	28.000	2.300	3.400	1.700 <T
JUL	.760 <T	.990 <T	19.000	5.700	4.300	2.000 <T
SEP	.780 <T	.880 <T	80.000	2.100	1.800 <T	.770 <T
OCT	1.900 <T	1.300 <T	20.000	3.100	2.300	1.100 <T
NOV	1.900 <T	1.800 <T	.	.	3.100	1.400 <T
DEC	2.200	.510 <T	.	.	1.800 <T	.790 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROCYCLOPENTADIENE (NG/L)			DET'N LIMIT = 5.0		GUIDELINE = 206000 (D4)	
OCT	BDL	175.000	.	235.000	.	BDL .
NOV	BDL	210.000	.	.	.	BDL .
DEC	BDL	BDL	.	.	.	INR .

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (G)	
JAN	2.000 <T	BDL	.	.	.	3.000 <T .
FEB	BDL	BDL	.	.	.	BDL .
MAR	BDL	BDL	.	.	.	ILA .
APR	1.000 <T	2.000 <T	.	.	.	2.000 <T .
MAY	1.000 <T	1.000 <T	.	.	.	1.000 <T .
JUN	BDL	BDL	.	BDL	.	. .
JUL	2.000 <T	1.000 <T	.	BDL	.	2.000 <T .
SEP	BDL	1.000 <T	.	2.000 <T	.	BDL .
OCT	BDL	BDL	.	BDL	.	BDL .
NOV	1.000 <T	1.000 <T	.	BDL	.	BDL .
DEC	1.000 <T	1.000 <T	.	.	.	BDL .
			.	.	.	INR .

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .200		GUIDELINE = 2 (A4)	
JAN	.600 <T	1.000				
FEB	1.000	.800 <T				
MAR	1.000	1.600				
APR	BDL	BDL				
MAY	BDL	.400 <T				
JUN	.600 <T	.600 <T				
JUL	.400 <T	BDL				
SEP	BDL	BDL				
OCT	.800 <T	.800 <T				
NOV	BDL	.600 <T				
DEC	.800 <T	.800 <T				

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.	.	.	BDL .
MAR	.100 <T	.150 <T	.	.	.	BDL .
APR	BDL	.050 <T	.	.	.	BDL .
MAY	BDL	BDL	.	BDL	.	BDL .
JUN	BDL	BDL	.	BDL	.	BDL .
JUL	BDL	BDL	.	BDL	.	BDL .
SEP	BDL	BDL	.	BDL	.	BDL .
OCT	BDL	BDL	.	BDL	.	BDL .
NOV	BDL	BDL	.	.	.	BDL .
DEC	BDL	BDL	.	.	.	BDL .
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
JAN	BDL	BDL	.	.	.	.050 <T .
MAR	BDL	BDL	.	.	.	BDL .
APR	BDL	BDL	.	.	.	BDL .
MAY	BDL	BDL	.	BDL	.	BDL .
JUN	BDL	BDL	.	BDL	.	BDL .
JUL	BDL	BDL	.	BDL	.	BDL .
SEP	BDL	BDL	.	BDL	.	BDL .
OCT	BDL	BDL	.	BDL	.	BDL .
NOV	BDL	BDL	.	.	.	BDL .
DEC	BDL	BDL	.	.	.	BDL .
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
JAN	BDL	BDL	.	.	.	.050 <T .
MAR	.150 <T	.200 <T	.	.	.	BDL .
APR	BDL	.200 <T	.	.	.	.200 <T .
MAY	BDL	BDL	.	.050 <T	.	BDL .
JUN	BDL	BDL	.	.100 <T	.	.200 <T .
JUL	BDL	BDL	.	BDL	.	.100 <T .
SEP	.100 <T	.150 <T	.	.150 <T	.	.150 <T .
OCT	.050 <T	BDL	.	.050 <T	.	.050 <T .
NOV	.050 <T	.100 <T	.	.	.	.050 <T .
DEC	BDL	BDL	.	.	.	.050 <T .

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
JAN	.100 <T	BDL	.	.	.	.100 <T .
MAR	.300 <T	.150 <T	.	.	.	.100 <T .
APR	BDL	.200 <T	.	.	.	.300 <T .
MAY	BDL	.050 <T	.	.100 <T	.	.100 <T .
JUN	.050 <T	.050 <T	.	.100 <T	.	.250 <T .
JUL	BDL	BDL	.	.050 <T	.	.150 <T .
SEP	.150 <T	.200 <T	.	.200 <T	.	.250 <T .
OCT	.100 <T	.050 <T	.	.100 <T	.	.150 <T .
NOV	.100 <T	.050 <T	.	.	.	.150 <T .
DEC	.100 <T	.050 <T	.	.	.	.150 <T .
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	121.300	.	.	.	130.500 .
MAR	BDL	108.500	.	.	.	125.300 .
APR	BDL	104.300	.	.	.	118.500 .
MAY	BDL	92.700	.	77.500	.	95.300 .
JUN	BDL	114.200	.	111.000	.	128.000 .
JUL	BDL	129.100	.	100.800	.	126.200 .
SEP	BDL	124.800	.	110.500	.	139.000 .
OCT	BDL	140.900	.	122.400	.	131.800 .
NOV	BDL	101.600	.	.	.	115.600 .
DEC	BDL	93.900	.	.	.	99.800 .
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
JAN	BDL	BDL	.	.	.	.040 <T .
MAR	BDL	BDL	.	.	.	BDL .
APR	BDL	BDL	.	.	.	BDL .
MAY	BDL	BDL	.	BDL	.	BDL .
JUN	BDL	BDL	.	BDL	.	BDL .
JUL	BDL	BDL	.	BDL	.	BDL .
SEP	BDL	BDL	.	BDL	.	BDL .
OCT	BDL	BDL	.	BDL	.	BDL .
NOV	BDL	BDL	.	.	.	BDL .
DEC	BDL	BDL	.	.	.	BDL .

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (LOCH LOMOND WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
JAN	BDL	4.200	.	.	.	4.100 .
MAR	BDL	4.450	.	.	.	4.000 .
APR	BDL	3.750	.	.	.	3.900 .
MAY	BDL	3.500	.	.	.	3.300 .
JUN	BDL	3.550	.	2.950	.	3.650 .
JUL	BDL	4.150	.	3.400	.	3.650 .
SEP	BDL	4.200	.	3.150	.	4.150 .
OCT	BDL	4.350	.	3.800	.	4.050 .
NOV	BDL	3.800	.	4.150	.	3.950 .
DEC	BDL	3.600	.	.	.	3.500 .
			.	.	.	
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)		
JAN	BDL	BDL	.	.	.	BDL .
MAR	BDL	BDL	.	.	.	BDL .
APR	BDL	BDL	.	.	.	BDL .
MAY	BDL	BDL	.	.	.	BDL .
JUN	BDL	.100 <T	.	BDL	.	.150 <T .
JUL	BDL	BDL	.	.150 <T	.	.050 <T .
SEP	BDL	.100 <T	.	BDL	.	.100 <T .
OCT	BDL	BDL	.	.150 <T	.	BDL .
NOV	BDL	BDL	.	BDL	.	BDL .
DEC	BDL	BDL	.	.	.	BDL .
			.	.	.	
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)		
JAN	BDL	125.500	.	.	.	134.550 .
MAR	BDL	112.950	.	.	.	129.350 .
APR	BDL	108.050	.	.	.	122.400 .
MAY	BDL	96.200	.	.	.	98.600 .
JUN	BDL	117.750	.	80.450	.	131.650 .
JUL	BDL	133.250	.	114.400	.	129.900 .
SEP	BDL	128.950	.	103.950	.	143.150 .
OCT	BDL	145.250	.	114.300	.	135.850 .
NOV	BDL	105.400	.	126.500	.	119.550 .
DEC	BDL	97.550	.	.	.	103.350 .
			.	.	.	

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedance,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the MOE Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

PROGRAM INPUT - PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, the questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area;

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

PROGRAM INPUT - FIELD DATA

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

PROGRAM INPUT - LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

PROGRAM INPUT - PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

PROGRAM OUTPUT - QUERY

All DWSP information is easily accessed through the Query function. Therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHCD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) **(OPOPUP)**	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics **(OWOC) (OAPAHX)**	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.